

## ***Eucalyptus calycogona* subsp. *miracula* (Myrtaceae), a new subspecies from the central wheatbelt of Western Australia**

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### **Abstract**

Nicolle, D. & French, M.E. *Eucalyptus calycogona* subsp. *miracula* (Myrtaceae), a new subspecies from the central wheatbelt of Western Australia. *Nuytsia* 19(1): 99–105 (2009). A new subspecies of *Eucalyptus calycogona* Turcz. is described, differing from the other three subspecies of *E. calycogona* by the waxy branchlets, buds and fruits, the generally broader, dull adult leaves which are bluish at least when new, the consistently elliptical to ovate seedling leaves, and the generally larger flower buds and fruits. The new subspecies is distributed on the eastern edge of the central wheatbelt in Western Australia, to the north-west of the distribution of subsp. *calycogona*. A key to *E. ser. Heterostemones* Benth., a map indicating the distribution of *E. calycogona* in Western Australia, and illustration of the holotype and habit of *E. calycogona* subsp. *miracula* D.Nicolle & M.E.French are included.

### **Introduction**

*Eucalyptus calycogona* Turcz. is a mallee species with a scattered distribution through the wheatbelt areas of southern Australia. The species is distinguished by a large suite of characters, but is most readily identified in the field by the cylindrical to urceolate fruits which are much longer than wide, and which are square in transverse section and usually four-ribbed, and by the flowers with prominent staminodes, where the outer filaments lack anthers, are twisted, and are much longer than the inner fertile filaments. *Eucalyptus calycogona* was revised by Nicolle (2000a), who recognised three subspecies (subsp. *calycogona*, *spaffordii* D.Nicolle and *trachybasis* D.Nicolle), of which only subsp. *calycogona* was recognised in Western Australia.

*Eucalyptus calycogona* subsp. *miracula* D.Nicolle & M.E.French was first collected by us in the field in September 2000 near Waterbitten Rock, in the south of the subspecies' distribution, when we recognised the population as an atypical waxy variant of *E. calycogona* subsp. *calycogona*. Further collections from similarly waxy populations were subsequently made by us further to the north and north east. Examination of herbarium specimens at PERTH has also revealed a few earlier collections (one in 1969 and none others earlier than 1982) which were included under *E. calycogona* or *E. celastroides* Turcz. at the time, but have adult morphology matching the new subspecies described here. Ongoing field research and field collecting, examination of herbarium material in AD and PERTH, and seedling studies, both of *E. calycogona* and related taxa, indicate that populations in the central wheatbelt between Burracoppin, the Parker Range, and Woolcutty are worthy of taxonomic recognition, and

are distinctive in both adult and seedling morphology and form part of a geographical replacement pattern with the other subspecies of *E. calycogona*.

*Eucalyptus calycogona* belongs to *E. ser. Heterostemones*, which is distinguished within the genus by the combination of the following characteristics (amended from Brooker 2000):

*E. subgen. Symphyomyrtus* (Schauer) Brooker – cotyledons folded in seeds; buds bi-operculate; seeds with ventral or terminal hilum; seed coat formed from both integuments (in the very few taxa investigated, see Gauba & Pryor 1961).

*E. sect. Bisectae* Maiden ex Brooker – Cotyledons bisected; inflorescences axillary.

*E. subsect. Destitutae* Brooker – Pith of branchlets without glands.

*E. ser. Heterostemones* Benth. – Staminalodes present; stamens inflexed; secondary veins of leaf visible, at a very acute angle at base of leaf; ovules in four vertical rows.

Seven species (*E. celastroides* with two subspecies and *E. calycogona* with four subspecies) are here recognised in *E. ser. Heterostemones*. The series is most diverse in the wheatbelt and goldfields regions of south-western Western Australia, where five species are endemic, and with two species (*E. calycogona* and *E. gracilis* F. Muell.) widespread across southern Australia, occurring in Western Australia, South Australia, Victoria and New South Wales.

*Eucalyptus calycogona* was revised by Nicolle (2000a), who recognised three subspecies (*calycogona*, *spaffordii* and *trachybasis*) and described the new obligate seeder species *E. prolixa* D.Nicolle. *Eucalyptus calycogona* and *E. prolixa* are distinguished within *E. ser. Heterostemones* by the cylindrical to urceolate fruits which are much longer than wide, and which are square in transverse section and usually four-ribbed. These two species differ in their habit and regenerative strategy, while herbarium specimens of *E. prolixa* may be distinguished from *E. calycogona* in their relatively long but slender fruits which are prominently four-ribbed.

Four subspecies in *E. calycogona* are now recognised with the description of subsp. *miracula* here. *Eucalyptus calycogona* subsp. *spaffordii* is endemic to Eyre Peninsula in South Australia while subsp. *trachybasis* occurs in eastern South Australia and adjacent areas of north-western Victoria and south-western New South Wales. *Eucalyptus calycogona* subsp. *calycogona* has two broad areas of distribution – the central and southern wheatbelt area of Western Australia and the peninsular region of South Australia – with a large disjunction in the more arid Nullarbor region in between.

### Key to the taxa of *Eucalyptus. ser. Heterostemones*

1. Buds and fruits square in transverse section, at least on lower part of hypanthia
2. Non-lignotuberous tree; obligate seeder ..... ***E. prolixa***
- 2: Lignotuberous mallee; resprouter
3. Fruits obconical to cupular in outline..... ***E. quadrans***
- 3: Fruits oblong to urceolate in outline (*E. calycogona*)

- 4. Branchlets, buds and fruits waxy; adult leaves usually dull.....**E. calycogona** subsp. **miracula**
- 4: Branchlets, buds and fruits never waxy; adult leaves glossy
  - 5. Adult leaves mostly 14–24 mm wide; fruit 6–9 mm wide, ribs prominent .....**E. calycogona** subsp. **spaffordii**
  - 5: Adult leaves mostly 6–15 mm wide; fruit 3–7 mm wide, ribs less prominent
    - 6. Bark smooth or rough only at base ..... **E. calycogona** subsp. **calycogona**
    - 6: Bark rough and tessellated on lower stems.....**E. calycogona** subsp. **trachybasis**
- 1: Buds and fruits round in transverse section
  - 7. Pedicels equal to or longer than bud length.....**E. yilgarnensis**
  - 7: Pedicels shorter than bud length
    - 8. Fruits urceolate to narrowly barrel-shaped, longer than broad (*E. celastroides*)
      - 9. Branchlets usually waxy; adult leaves bluish green ..... **E. celastroides** subsp. **celastroides**
      - 9: Branchlets never waxy; adult leaves glossy green..... **E. celastroides** subsp. **virella**
    - 8: Fruits obconical to cupular to barrel-shaped, approximately equidimensional
      - 10. Peduncles >5 mm long; upper bark smooth.....**E. gracilis**
      - 10: Peduncles to 5 mm long; rough bark to smaller branches.....**E. brevipes**

### Taxonomy

**Eucalyptus calycogona** Turcz. subsp. **miracula** D.Nicolle & M.E.French, *subsp. nov.*

A subspecies typical ramulis alabastris fructibusque pruinosis, foliis adultis hebetibus et saepe latioribus, foliis plantularum ellipticis vel ovatis, et alabastris fructibusque plerumque majoribus differt.

*Typus*: south-east of Marvel Loch, Western Australia, 31° 32' 43" S, 119° 35' 04" E, 21 September 2004, D. Nicolle 4794 & M.E. French (*holo*: PERTH 07155190; *iso*: AD, CANB, NSW).

*Eucalyptus* sp. Marvel Loch (D. Nicolle & M. French DN 4794); *Eucalyptus calycogona* subsp. *glaucessima* D. Nicolle ms, in Council of Heads of Australasian Herbaria, *Australian Plant Census*, <http://www.chah.gov.au/apc/index.html> [accessed 23 April 2008].

Distinguished within *E. calycogona* by the waxy branchlets, buds and fruits, the generally broader, dull adult leaves which are bluish at least when new, the consistently elliptical to ovate seedling leaves, and the generally larger flower buds and fruits.

*Mallee* 3–5 m tall; lignotuber present (lignotuber sprouter). *Bark* smooth throughout, cream to leaden-grey over pale grey to reddish-tan, decorticating in strips. *Branchlets* waxy, lacking pith glands. *Juvenile leaves* opposite for a few pairs then becoming disjunct, sessile becoming shortly petiolate, elliptical to ovate, to 40 mm long by 18 mm wide, slightly discoloured, dull, blue-green, sometimes slightly waxy; new juvenile growth and stems waxy. *Adult leaves* with petiole 11–18 mm long; lamina lanceolate to broad-lanceolate, 55–90(–110) mm long by 8–18(–22) mm wide, dull, bluish and waxy at first, maturing to dull to slightly glossy and blue-green to dark green; vein reticulation moderate with scattered island oil glands. *Inflorescences* axillary, unbranched, 7-flowered; peduncles terete to angular, 7–12 mm long; pedicels angular, 2–5 mm long. *Flower buds* pedicellate, waxy, quadrangular,



9–11 mm long by 4–5 mm wide; hypanthia obconical, with four longitudinal ribs; opercula pyramidal, usually smooth, 4–5 mm long. *Stamens* white; outer filaments much longer than inner filaments and lacking anthers (staminodes). *Fruits* pedicellate, waxy when young, oblong-cylindrical to slightly urceolate and square in cross-section, with four longitudinal ribs, 9–13 mm long by 5–8 mm wide; disc vertically descending, rim thin; valves four, deeply enclosed. *Seeds* angular-ovoid, very finely pitted-reticulate, slightly glossy, brown. (Figures 1, 2)

*Selected specimens.* WESTERNAUSTRALIA: 26 km due SW of Bodallin, 17 Sep. 1982, *R.J. Cranfield* 2477 (PERTH); SE of South Burracoppin, 13 Aug. 2001, *M.E. French* 1387 (AD, PERTH); N of Great Eastern Highway, W of Karalee Rock, 20 Apr. 2003, *M.E. French* 1546 (PERTH); south-east of Marvel Loch on Forrestania – Southern Cross road, 16 Nov. 2003, *M.E. French* 1561 (PERTH); about 6 km SSW of Mt Caudan, Parker Range, 17 Oct. 1994, *N. Gibson & M. Lyons* 1984 (BRI, PERTH); c. 4.8 km SSE of Hill 444, near Olga Mine, Parker Range, 13 Oct. 1994, *N. Gibson & M. Lyons* 2246 (NSW, PERTH); c. 3 km SE of Waterbidden Rock, 17 Sep. 2000, *D. Nicolle* 3450 & *M.E. French* (AD, CANB, PERTH); Dulyabin Rd, south-west of Bodallin, 21 Sep. 2004, *D. Nicolle* 4786 & *M.E. French* (AD, CANB, NSW, PERTH); Ivey Road, south of Bodallin, 21 Sep. 2004, *D. Nicolle* 4789 & *M.E. French* (CANB, PERTH); Meranda North Road, E of Muntadgin, 6 Jan. 2007, *D. Nicolle* 5035 & *M.E. French* (CANB, PERTH); 16 miles S Karalee, 24 Mar. 1969, *R.D. Royce* 8563 (PERTH); 4.1 km S on Parker Range Road from Southern Cross turnoff, 31 Oct. 2000, *A. V. Slee* 4318 & *J. Connors* (CANB, PERTH); 24 km SSE of Carrabin (NNE of Noombenderry Rock), 15–17 Sep. 1982, *A. Strid* 20322 (PERTH); Cramphorne Road, 2.1 km W of Nulla Nulla Road, 28 Feb. 1993, *P. White* 549 (PERTH).

*Distribution and habitat.* *Eucalyptus calycogona* subsp. *miracula* is distributed on the eastern edge of the central wheatbelt in south-west Western Australia within the transitional rainfall zone of Hopper (1979), in the area bounded by Burracoppin in the north-west, the Parker Range area (south of Southern Cross) in the east and Holleton (east of Narembreen) in the south, over a total linear range of c. 90 km east-west and c. 50 km north-south. This area is to the north of the distribution of subsp. *calycogona* (Figure 3). The new subspecies occurs in mallee and mixed mallee-mallet vegetation on pale orange to red clay-loams to thin stony loams with ironstone gravel. Associated eucalypts include *Eucalyptus capillosa* Brooker & Hopper, *E. celastroides* subsp. *celastroides*, *E. flocktoniae* (Maiden) Maiden subsp. *flocktoniae*, *E. moderata* L.A.S.Johnson & K.D.Hill, *E. neutra* D.Nicolle, *E. salmonophloia* F.Muell., *E. salubris* F.Muell., *E. sheathiana* Maiden, *E. subangusta* (Blakely) Brooker & Hopper subsp. *subangusta*, *E. tenera* L.A.S.Johnson & K.D.Hill, *E. tephroclada* L.A.S.Johnson & K.D.Hill and *E. yilgarnensis* (Maiden) Brooker.

*Conservation status.* Western populations occur in remnant roadside vegetation and in conservation reserves fragmented by agricultural land cleared for cropping, while eastern populations occur in largely uncleared areas but may be under threat from mining exploration and extraction activities, especially in the Marvel Loch area. The subspecies has been collected in conservation reserves to the south-east of Burracoppin.

*Etymology.* From the Latin *miraculum* (marvel), with two intended meanings; firstly referring to the prevalence of the subspecies in the Marvel Loch area, and secondly because we were somewhat surprised that the taxon went unrecognised and poorly collected until recently, despite its distinctiveness in the field and herbarium.

*Notes.* *Eucalyptus calycogona* subsp. *miracula* is distinguished within the species by its waxy branchlets, buds and fruits, the generally broader, dull adult leaves which are bluish at least when new, the consistently elliptical to ovate seedling leaves, and the generally larger flower buds and



Figure 1. Holotype of *Eucalyptus calycogona* subsp. *miracula* (D. Nicolle 4794 & M.E. French), scale = 5 cm.



Figure 2. Habit and habitat of *Eucalyptus calycogona* subsp. *miracula* (Dulyabin Road, south-west of Bodallin, 31° 36' 16" S, 118° 46' 05" E, D. Nicolle 4786 & M.E. French).

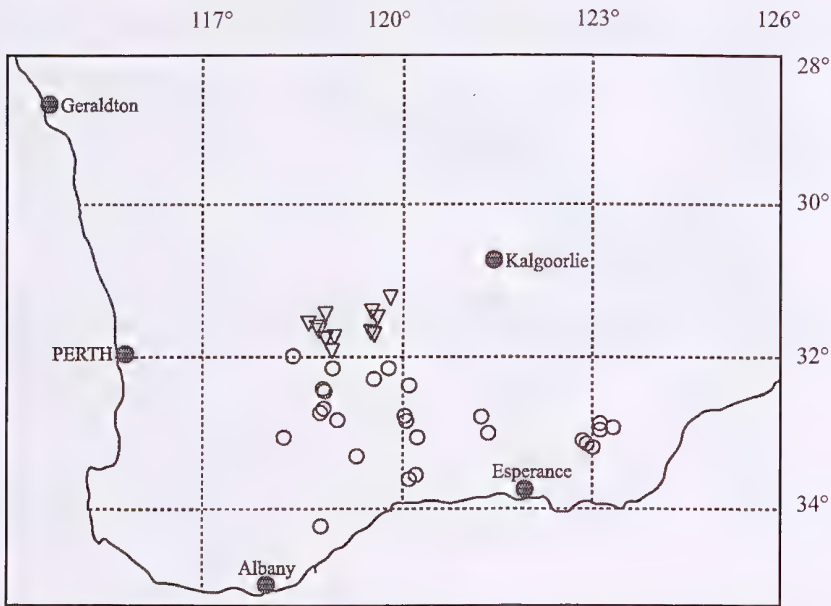


Figure 3. Distribution of *Eucalyptus calycogona* subsp. *calycogona* (○) and subsp. *miracula* (▽) in south-western Australia.



fruits. The new subspecies occurs to the north of the distribution of subsp. *calycogona*, and appears to form a geographical replacement pattern. Subspecific rather than specific status therefore seems appropriate. This is consistent with some other Western Australian mallee taxa which are distinguished by a similar suite of characters as subsp. *miracula* and form a geographical replacement pattern, such as *E. subangusta* Blakely subsp. *cerina* Brooker & Hopper (Brooker & Hopper 1991), *E. ebbanoensis* Maiden subsp. *glaucliramula* K.D.Hill & L.A.S.Johnson (Hill & Johnson 1998) and *E. gittinsii* Brooker & Blaxell subsp. *illucida* D.Nicolle (Nicolle 2000b).

The Karalee populations of *E. calycogona* subsp. *miracula*, which represent the most north-easterly populations of the subspecies and are disjunct by approximately 40 km from the closest populations of the subspecies elsewhere (near Marvel Loch), are morphologically somewhat distinct, lacking distinctive wax on the branchlets, buds and fruits. They nevertheless have characteristics in common with subsp. *miracula* elsewhere, including the dull leaves, and have been tentatively included in subsp. *miracula* here.

*Eucalyptus prolixa* is partly sympatric with *E. calycogona* subsp. *miracula* in the south and east of the latter's distribution, although the two taxa appear to be ecologically separated, with *E. prolixa* occurring on more fertile, heavier soils and more often in mallee woodland vegetation communities. *Eucalyptus prolixa* is similarly partly sympatric with *E. calycogona* subsp. *calycogona* in the eastern part of the latter's Western Australian distribution, and again appears to be similarly ecologically separated. *Eucalyptus prolixa* is distinguished from *E. calycogona* in being a mallee and lacking a lignotuber (an obligate seeder, see Nicolle 2006), and also in its generally longer and more prominently four-ridged buds and fruits.

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